

Navigating the Celestial Sphere (Globe) Activity---To The Teacher

Do you have access to celestial spheres?

If not, and your budget permits, Frey Scientific has several available ranging from \$63-\$170.

See descriptions of these globes at

<http://marketplace.junebox.com:80/control/browsePerformSearch>

The following activity is one that gets groups of two-three students to investigate the relationship between the Sun, Earth, and various constellations as well as the concepts of right ascension and declination as used to locate celestial objects.

An answer sheet is available upon teacher request by emailing me at:

mmathras@charter.net

Navigating the Celestial Sphere....Mr. Mathras...Space Science/Astronomy

Make no marks on this paper.

Note: Star names on the globe are labeled in black, constellations are labeled in blue.

1. Locate the legend on the celestial globe that describes the icons. According to this legend, what happens to the numerical value of the STAR MAGNITUDE as stars appear dimmer (smaller icon) here on Earth?
2. Locate the ecliptic on the celestial sphere (circle of dates, inclined to the celestial equator), which depicts the position of the sun in the sky at various times of the year. On what date is the sun highest in the sky? (Note: you have to look THROUGH the sphere to read the labels correctly.)
3. On this date, how many degrees above the celestial equator is the sun located?
4. On what date is the sun lowest in the sky?
5. On this date, how many degrees below the celestial equator is the sun located?
6. On what TWO dates is the sun crossing over the celestial equator?
7. On December 25th what constellation does the sun block out?
8. In what constellation is the sun on Oct. 15th?
9. In what constellation is the sun on July 4th?
10. Name the star that is located almost directly above the Earth's north pole.
11. This star is found in the end of the handle of the "Little Dipper" (...NOT labeled on the sphere.) Locate the star KOCHAB in the Little Dipper (found at the mouth of the bucket.) What magnitude is KOCHAB?
12. The Little Dipper appears to empty into the Big Dipper (also, NOT labeled on the sphere.) How many stars appear to comprise the Big Dipper?
13. What is the brightest star in the Big Dipper?
14. What Greek letter appears next to this brightest star?
15. What is the second brightest star found here?
16. What type of celestial object is MIZAR?
17. What type of celestial object is ALIOTH?
18. About how many degrees (give a range) above the celestial equator is the Big Dipper?
19. The Big Dipper is only a part of what larger constellation?
20. How many degrees from its present site was the celestial pole located in 4500 BC?
(Checkout the black, circular ring with arrows running through POLARIS.)

21. Near what major star was the celestial pole located in 11000 BC?
22. When will it be located here again?
23. Using the data for #21 & 22, how many years pass for the Earth to make one “precessional wobble?”
24. A line drawn through what two stars in the Big Dipper points close to POLARIS?
25. How many degrees from DUBHE is POLARIS located?
26. Follow this line from DUBHE through POLARIS to the constellation CASSEIOPEIA. Is CASSEIOPEIA found in the ecliptic?
27. CASSEIOPEIA (from the Earth) resembles what letter of our alphabet? (Only consider its 6 brightest stars for this question?)
28. At about how many hours of right ascension is the star CAPH located? (Note: Right ascension is labeled along the celestial equator.)
29. 0 h (zero hours) of right ascension was arbitrarily assigned to be the position of the sun at the instant of a major annual astronomical event. Find 0 h of right ascension on the ecliptic, check out the date at this point, and now name the event that’s occurring here. (Page 15 in your text may help out here.)
30. What star is located at about 6 h of right ascension and $+8^\circ$ declination? (“+” is equivalent to North latitude, “-” is equivalent to South latitude.)
31. In what major constellation is this star located?
32. Is this constellation one of those in the zodiac?
33. Locate SIRIUS (the brightest star in the sky) to the lower left of this constellation. Give the coordinates (right ascension and declination) of this star. (Be sure to include + or – in your declination.)
34. Notice the very irregular band running diagonally around the celestial globe (white on the outside, yellow when viewed from the inside of the globe.) This is the Milky Way galaxy of which our solar system is a tiny part. Describe the region of the celestial globe (RA and declination) where we are looking through the “center” of our Milky Way galaxy. (This would be the thickest part of the irregular band.)
35. Towards which part of the Milky Way Galaxy are we looking between 7-8 h of RA and $+40^\circ$ and -40° of declination?
36. What astronomical “oddity” is located at 5h 30m of RA and $+21^\circ$ dec.?